properties such that it can be found in the presence of noise, and conducting a trial and error adjustment of a transmit frame timing delay value prior to each transmission of said ranging signal until receiving a message from said headend transceiver that a ranging signal has been found in a gap surrounding a reference time, said gap being an interval during upstream transmissions from said plurality of distributed remote transceivers to said headend transceiver when transmissions of anything other than ranging signals by said remote transceivers is not permitted;

(b) when said message is received by the remote transceiver that transmitted said ranging signal, holding said transmit frame timing delay at the same value it had just before receiving said message, and transmitting identifying information to said headend transceiver to identify said remote transceiver; and

(c) receiving a message from said headend transceiver directed to said remote transceiver which transmitted said identifying information indicating by how much to adjust said transmit frame timing delay such that frames transmitted from said remote transceiver will have their frame boundaries exactly or almost exactly aligned in time at the location of said headend transceiver with the frame boundaries of frames transmitted from other said remote transceivers.

2. The process of claim 1 wherein one of said gaps is between every upstream frame, and wherein said step of transmitting identifying information comprises the steps of sending a unique sequence of transmissions over an authentication interval

comprised of an even number of said gaps, said unique sequence of transmissions comprised of transmissions of said ranging signal and silent intervals when no ranging signal is transmitted during said authentication interval, the exact sequence of ranging signals and silent intervals being unique to said remote transceiver and having ranging signals sent during exactly 50% of said gaps of said authentication interval.

3. The process of claim 2 further comprising the steps performed after step (b) and before step (c) of receiving a message from said headend transceiver indicating whether a ranging signal was received in more than 50% of said gaps of said authentication interval, and, if so, performing a contention resolution algorithm comprised of a random decision to stop the ranging process or continue with it, with the probability of either outcome being 50%, and if the decision not to continue ranging is made, stopping the ranging process for an interval and not performing step (c), and then commencing ranging again with step (a) but starting with the transmit frame timing delay which existed at the time the decision to stop ranging was made.

4. A ranging process for use in a distributed system comprising a central transceiver coupled by a shared transmission media to a plurality of remote transceiver at physically disparate locations at least two of which send frames of digital data of the same size on the same frequency to said central transceiver, comprising the steps of:

adjusting a transmit frame timing delay value in each remote transceiver so as to achieve frame synchronization such that frames transmitted by each remote transceiver arrive with their frame boundaries aligned in time with the frame boundaries of frames transmitted by others of said remote transceivers

which have achieved frame synchronization by performing the following steps in each remote transceiver:

determining the propagation time in said remote transceiver from said remote transceiver to said central transceiver via said shared transmission media by iteratively transmitting a ranging signal which can be detected by said central transceiver in the presence of noise and which is transmitted by said remote transceiver in response to receipt of an invitation signal transmitted by said central transceiver, and adjusting a transmit frame timing delay value for said remote transceiver prior to each transmission of said ranging signal until a transmit frame timing delay value is reached which causes said remote transceiver to receive one or more messages from said central transceiver, and using said messages to determine when a transmit frame timing delay value has been reached that causes said ranging signal to arrive at said central transceiver during an interval that encompasses a time of arrival at said central transceiver which would cause frame synchronization to exist for said remote transceiver, and then transmitting signals that identify said remote transceiver to said central transceiver, and using said one or more messages to make proper additional adjustments to said transmit frame timing delay value so as to achieve frame synchronization with frames transmitted from all other remote transceivers which have previously successfully achieved frame synchronization;

after frame synchronization has been achieved, thereafter using

the value so fixed for said transmit frame timing delay for every transmission by said remote transceiver to said central transceiver.

5. The process of claim 4 further comprising the steps of, from time to time after frame synchronization has been achieved, performing the following training process to verify that frame synchronization still exists and make adjustments if it does not still exist, said training process comprising:

sending training data from said remote transceiver to said central transceiver, said training data having its spectrum spread by a predetermined spreading code which is one of the middle codes in a group of contiguous, orthogonal, cyclic spreading codes and is known to said central transceiver;

determining in said central transceiver if said training data was received solely on said predetermined spreading code or if some of the energy of said training data was received on any of said contiguous, orthogonal cyclic codes;

if said training data was received only on said predetermined spreading code, doing nothing;

if some or all of the energy of said training data was received on any of said contiguous, orthogonal, cyclic spreading codes, performing a fine tuning process to calculate the time offset between the actual time of arrival at said central transceiver of a transmission from said remote transceiver and the desired time of arrival which would cause frame synchronization to exist, and sending a message to said remote transceiver telling it by how much to adjust its transmit frame timing delay to achieve frame synchronization.

6. The process of claim 4 wherein said remote transceivers transmit data to said central transceiver in frames each of which includes a guardband during which no data is sent, and wherein said central transceiver sends a message to said remote transcevier when said ranging signal is received at said central transceiver during said guardband, and wherein said step of using said one or more messages to make proper additional adjustments to said transmit frame timing delay value so as to achieve frame synchronization comprises receiving a message that includes fine tuning adjustment data that indicates the distance and direction in time of the actual arrival time of said ranging signal from a predetermined desired location in said guardband which would cause frame synchronization to exist and using said fine tuning adjustment data to adjust said transmit frame timing delay to achieve precise frame synchronization.

7. The process of claim 5 wherein said remote transceivers transmit data to said central transceiver in frames each of which includes a guardband during which no data is sent, and wherein said central transceiver sends a message to said remote transceiver when said ranging signal is received at said central transceiver during said guardband, and wherein said step of using said one or more messages to make proper additional adjustments to said transmit frame timing delay value so as to achieve frame synchronization comprises receiving a message that includes fine tuning adjustment data that indicates the distance and direction in time of the actual arrival time of said ranging signal from a predetermined desired location in said guardband which would cause frame synchronization to exist and using said fine tuning adjustment data to adjust said transmit frame timing delay to achieve precise frame synchronization.

8. The process of claim 4 further comprising a power alignment process carried out in a remote transceiver comprising the steps:

setting the gain of a scaling amplifier in said remote transceiver to a predetermined initial level;

iteratively transmitting training data having its spectrum spread by a predetermined code in a group of orthogonal, cyclic spreading codes and modulated using BPSK modulation on an upstream radio frequency carrier; and

receiving a final gain correction factor from said central transceiver after said central transceiver has received said iterative transmissions of training data and an adaptive gain control circuit therein has converged on a final gain control factor that minimizes reception errors of said training data; and

setting the gain of said scaling amplifier in said remote transceiver to the value of said final gain correction factor.

9. The process of claim 4 further comprising a power alignment process carried out in said central transceiver comprising the steps:

setting the gain of an amplfier in an adaptive gain control circuit in said central transceiver to an initial gain level for said predetermined code to minimize reception errors of data spread by that code;

receiving iterative transmissions of BPSK modulated training data transmitted by a remote transceiver whose gain level is to be aligned, and making an adjustment to a gain correction factor to reduce slicer error in receiving said training data after each iteration until convergence on a final gain correction factor is achieved; and

sending the final gain correction factor downstream to said remote transceiver and setting the gain of said amplifier in the adaptive gain control circuit in said central transceiver to one.

10. The process of claim 4 further comprising an upstream equalization process carried out in said central transceiver for each remote transceiver comprising the steps:

sending a message to said remote transceiver requesting it to iteratively transmit training data to said central transceiver, said training data having its spectrum spread by one or more of a plurality of adjacent, orthogonal, cyclic spreading codes;

iteratively adapting the tap weight coefficients of FFE and DFE equalizers until final tap weight coefficients are derived which minimize reception errors of said training data; and

sending the final tap weight coefficients to said remote transceiver and setting the tap weight coefficients of said FFE and DFE equalizers in said central transceiver to values which render said FFE and DFE equalizers transparent.

11. The process of claim 4 further comprising an upstream equalization process carried out in each remote transceiver comprising the steps:

(a) receiving a message from said central transceiver requesting the transmission of training data;

(b) iteratively transmitting training data having its spectrum spread with one or more of a plurality of orthogonal, cyclic spreading codes;

(c) receiving final tap weight coefficients from said central transceiver after convergence by equalization circuitry in said central transceiver on final tap weight coefficients that minimize reception errors of said training data;

(d) convolving said final tap weight coefficients with existing equalization filter coefficients in said remote transceiver used to send said training data, and setting said equalization filter coefficients to the tap weight coefficients resulting from said convolving process; and

(e) using the new equalization filter coefficients derived in step (d) for subsequent upstream transmissions of payload data.

12. The process of claim 4 further comprising a downstream equalization process carried out in said remote transceiver, comprising the steps:

receiving iteratively transmitting training data on at least one of a plurality of adjacent, orthogonal, cyclic spreading codes transmitted by said central transceiver;

adjusting the tap weight coefficients of a first adaptive equalization circuit including a slicer after receiving each iteration of training data until convergence on final tap weight coefficients is achieved that minimizes reception errors of said training data; and

transferring said final tap weight coefficients to a second equalization circuit in said remote transceiver.

13. A ranging process to achieve frame synchronization in each of a plurality of physically distributed remote units that transmit upstream frames of data on the same

medium and the same frequency to a central unit comprising the steps:

(a) broadcasting from said central unit a barker code during every frame;

(b) in each remote unit that is attempting to achieve frame synchronization, receiving said barker code broadcast by said central unit, and iteratively transmitting the same barker code back toward said central unit during each upstream frame after setting a trial and error value for a transmit timing delay before each transmission of said barker code;

(c) monitoring a ranging interval gap using a receiver in said central unit for receipt of said barker code by performing a correlation calculation;

(d) when said central unit detects a barker code in said gap, broadcasting a message to all remote units indicating a barker code has been found in said gap and asking each remote unit that is performing said ranging process to send a signature sequence to identify itself where said signature sequence comprises sending said barker code during a predetermined number which is less than all of the frames of a multiple frame authentication interval using the same transmit timing delay used in the last transmission of a barker code before receiving the message from said central unit that a barker code had been detected in the guardband, said transmissions of said barker code and silences during said authentication interval defining a signature sequence unique to said remote unit;

(e) performing a correlation in said central unit to determine during which gaps of the gaps in said authentication interval barker codes were received, and if more than said predetermined number of barker codes were received during said authentication interval;

(f) if barker codes are found in the correct predetermined number of gaps of said